Foreign cash holdings and credit rating: Evidence from U.S. multinationals

ABSTRACT

Using a sample of listed U.S. multinationals in 1999-2016, we document a positive correlation between foreign cash holdings and credit ratings, suggesting that firms may credibly signal their liquidity by accumulating large foreign cash reserves and pledging not to repatriate "in the foreseeable future". Also, we find that this positive correlation is stronger in financially distressed firms, suggesting that the escalated signaling costs (e.g., an increased penalty in the case of cash shortages) in financially distressed firms amplify the signaling effect of foreign cash holdings, and thus, strengthen its positive impact on credit rating assessments. These two findings hold for an instrumental variable approach, reducing the likelihood of our results being purely driven by endogeneity bias. In additional analyses, we find that rating agencies are more conservative in discounting the value of foreign cash holdings when multinational firms are at the investment-grade cutoff and/or are subject to higher repatriation costs.

Keywords: foreign cash holding, credit rating, repatriation tax, multinationals

I. INTRODUCTION

Although conventional wisdom suggests that firms with higher cash holdings should be "safer", Acharya, Davydenko, and Strebulaev (2012) provide evidence that risker firms are likely to reserve more cash. This puzzlingly positive correlation can be explained by the endogeneity of corporate financial and investment policies, in that risky firms tend to accumulate precautionary cash reserves to prepare for economic shocks (Acharya et al. 2012). However, the argument of

building up precautionary cash reserves cannot explain recent phenomena of U.S. multinational firms holding record high levels of cash overseas because liquidity risks are not lessened by stockpiles of foreign cash.

U.S. firms are taxed on their worldwide income, including earnings from foreign jurisdictions. To qualify for deferment of tax under the Indefinite Reversal Exception (ASC 740-30-25-17, formerly APB Opinion 23), U.S. multinationals must assert that foreign earnings are indefinitely reinvested abroad and are not expected to be repatriated "in the foreseeable future" (ASC 740- 30-25-18(a));[1] therefore, many U.S. multinationals designate foreign earnings as indefinitely reinvested, but hold in the forms of cash and cash equivalents if foreign investment opportunities are limited (Blouin, Krull, and Robinson. 2012; Chen 2015; Krull 2004; Song 2018). Such a designation helps firms defer tax payments until repatriating foreign earnings; however, once designated as indefinitely reinvested, foreign earnings (even in the form of cash) cannot be freely transferred to other jurisdictions to fund operations or resolve liquidity needs. For example, the 10-K filing of Methode Electronics Inc. in 2018 states, "Of the $246.1 million of cash and cash equivalents as of April 28, 2018, $239.3 million was held in subsidiaries outside the U.S. Other than specifically identified amounts, foreign earnings continue to be indefinitely reinvested outside the U.S. and therefore not available to fund our domestic operations." Therefore, people would naturally expect that, ceteris paribus, firms' risks of default increase with foreign cash holdings because these holdings are less accessible until paying a significant amount of repatriation tax (Dhaliwal, Erickson, Goldman, and Krull 2015). However, this conjecture might not be true since it overlooks the endogeneity of corporate financial policies. In specific, it is also possible that less risky firms do not need to repatriate foreign earnings,

[1] If no assertion is made, the U.S. GAAP requires the firm to recognize the expected tax expense on repatriating foreign earnings in the current period (Song 2018).

resulting in a negative correlation between default risks and foreign cash holdings. Therefore, the relation between foreign cash holdings and credit risks is still an empirical question.

Anecdotal evidence shows that Standard & Poor (S&P) indeed assesses the sources and uses of cash when rating nonfinancial corporations,[2] while multinational companies are requested to disclose foreign cash holdings and discuss any liquidity consequences in the "Liquidity and Capital Resources" section in the 10-K filings starting from 2009. Therefore, it is natural to conjecture that information concerning foreign cash (such as the amount and usage) disclosed in the 10-K should be an important factor in rating agencies' risk assessment. However, there exists a lack of research directly examining this question, and our paper attempts to fill this void by examining the empirical relationship between credit ratings and foreign cash holdings for U.S. multinationals.

The corporate credit rating reflects rating agencies' opinion on an entity's overall creditworthiness and its capacity to satisfy its financial obligations (Standard & Poor's 2002). In general, rating agencies collect and process information to provide independent assessments of firms' credit risks, such as the likelihood of default (Wakeman 1984). At first sight, it appears intuitive that foreign cash is less accessible than domestic cash, and thus, reduces domestic liquidity and firms' credit rating (Dhaliwal et al. 2015). However, this argument might be misleading because it overlooks the endogeneity of corporate financial policies, such as the signaling effects of large cash holdings. Signaling takes root in asymmetric information settings, where one party credibly conveys some information about itself to another party through a costly signal.[3] The notion that firms can signal their ability through large cash reserves is also in line

[2] https://www.spratings.com/documents/20184/774196/HowWeRateNonfinancialCorporateEntities_041019.pdf
[3] In Spence (1978)'s job-market signaling model, employees acquire costly education credentials to signal their ability. The credential enables the employer to reliably distinguish low ability workers from high ability workers.

with empirical evidence in the literature. For example, prior literature finds that firms may accumulate cash reserves to signal their fundamentals, investment opportunities, and ability to make a commitment (Beatty, Riffe, and Welch 1997; Gentry, Newbold, and Whitford 1985; Ghaly, Dang, and Stathopoulos 2015). Similarly, information asymmetry exists between multinational firms and credit rating agencies in our setting, and we argue that firms may accumulate foreign cash holdings (committing not to repatriate foreign earnings in the foreseeable future) to credibly signal their financial health and their ability to meet domestic liquidity needs. That is, we hypothesize a positive correlation between foreign cash holdings and firms' credit ratings.

To sustain a signaling equilibrium, a credible signal must be too costly to be imitated by a bad type.[4] In other words, the signaling effect of large foreign cash holdings should be more reliable when signaling costs are high, such as in financially distressed firms. We use three proxies for financial distress, including loss, Altman's Z-score, and the interest coverage ratio. Although loss, Z-score, and the interest coverage ratio do not necessarily predict firms' fundamentals and future performance (because they are calculated based on historical performance), it is obvious that, on average, loss-making firms and firms with a lower Z-score or interest coverage ratio are closer to a cash shortage, compared with their financially stable counterparts. Thus, it is more costly for them to build foreign cash reserves, which in turn credibly signals unobservable fundamentals. Therefore, we hypothesize that the positive correlation between foreign cash holdings and firms' credit ratings is more pronounced in financially distressed firms.

[4] In Spence (1978) 's job-market signaling model, the informational value of education credentials comes from the fact that employers believe the credential is positively correlated with the employee's ability and is difficult for low ability employees to obtain.

Using a sample of listed U.S. multinational firms from 1999 to 2016, we find a significantly positive association between foreign cash holdings and firms' credit ratings, suggesting that credit agencies perceive foreign cash holdings as a positive factor, since it may signal healthy fundamentals. The economic impact of foreign cash holdings on credit ratings is also meaningful. A one-standard deviation increase in foreign cash holdings would lead to a 0.47-rating-notch increase in firms' credit rating. We also perform two robustness tests. First, we use a "change regression" to identify whether incremental foreign cash holdings drive changes in a company's credit rating, and we document a significantly positive correlation, suggesting that a rating upgrade is more sensitive to larger increases in foreign cash holdings. Second, we use an alternative classification scheme to partition credit ratings into an investment grade and a speculative grade, and we find that foreign cash holdings are positively associated with the likelihood of being classified as investment grade. To summarize, our empirical results support our hypothesis of a positive correlation between foreign cash holdings and credit ratings. Our further cross-sectional tests find that the abovementioned positive correlation is more pronounced in loss-making firms, in firms with a low Altman's Z-score, and in firms with a low interest coverage ratio, suggesting that the escalated signaling costs in these three types of firms strengthen the positive impact of foreign cash holdings on credit rating assessments.

We recognize that potential endogeneity issues, such as omitted variables, reverse causality, or simultaneous decisions may arise in our analysis because it is a firm's choice whether to accumulate foreign cash. Thus, we adopt an instrument variable (IV) approach in additional analyses, and we confirm that our main conclusions are not affected, thus reducing the likelihood of our results being purely driven by endogeneity bias. In additional analyses, we also find that the positive association between foreign cash holdings and firms' credit ratings is weakened

when multinational firms are at the investment-grade cutoff and/or are subject to higher repatriation costs. Our findings suggest that rating agencies are more conservative in discounting the value of foreign cash holdings, when rating agencies have higher reputational concerns in assessing credit risks at the investment-grade cutoff, and when foreign cash holdings are located in low-tax countries, which are subject to more taxation upon repatriation.

Our paper relates to Dhaliwal et al. (2015)'s study, which also investigates the empirical relation between foreign cash holdings and credit ratings. There are two main differences. First, they test hypotheses using a sample from 1993 through 2009, in which firms were generally not required to disclose foreign cash holdings. Thus, they must estimate foreign cash holdings, and their proxy is subject to some limitations. In contrast, our data on foreign cash holdings are directly extracted from the 10-K.[5] Second, they argue that less accessible foreign cash reduces domestic liquidity and firms' credit rating, and they document a negative correlation between foreign cash holdings and credit ratings. In contrast, we respond to the call by Acharya et al. (2012) to take the endogeneity of corporate financial policies into consideration, and we provide evidence that foreign cash holdings signal firms' health, and thus, are positively correlated with credit ratings.

Our paper contributes to the existing literature in the following two ways. First, our paper complements the growing literature on foreign cash holdings and tax repatriation. One branch of the literature studies agency costs associated with foreign cash holdings, such as less value-enhancing investments and negative future profitability (e.g., Chen 2015; Hanlon, Lester, and Verdi 2015; Song 2018), while another branch of literature examines multinational firms' responses to U.S. tax policy, such as the American Jobs Creation Act (AJCA) of 2004 (e.g., De

[5] Details about the method of collecting foreign cash data from the 10-K are discussed in Appendix B.

Simone and Lester 2018; De Simone, Piotroski, and Tomy 2018; Dong and Zhao 2018). The main conclusion from the abovementioned literature is that high tax-induced foreign cash holdings in multinational firms increase agency costs, and thus, result in financing friction. In contrast, our paper examines foreign cash holdings from a different perspective by providing evidence that large foreign cash reserves can function as a credible signal of firms' healthy fundamentals, which thus improves credit ratings. Moreover, the signaling effect of foreign cash holdings is stronger in financially distressed firms in which the signaling costs of pledging not to repatriate cash in the foreseeable future are high. Note that our paper does not intend to deny the agency costs associated with foreign cash holdings, but we demonstrate the possibility of signaling via foreign cash holdings. Our argument is also consistent with anecdotal evidence that, in order to designate foreign earnings as indefinitely reinvested, firms must convince their auditors of sufficient liquidity to fund domestic operations without the use of foreign earnings (Song 2018), suggesting that foreign cash holdings are a valid indicator of sufficient liquidity.

Second, our paper enriches the literature on credit rating assessments (e.g., Ashbaugh-Skaife, Collins, and LaFond 2006; Attig, Ghoul, Guedhami, and Suh 2013; Bao, Billett, Smith, and Unlu 2019; Bhojraj and Sengupta 2003; Bonsall, Holzman, and Miller 2016; Cornaggia, Krishnan, and Wang 2017; Jiraporn, Jiraporn, Boeprasert, and Chang 2014; Kaplan and Urwitz 1979; Kuang and Qin 2013; Lee 2008; Liu and Jiraporn 2010; Molina 2005; Psillaki, Tsolas, and Margaritis 2010; Ziebart and Reiter 1992), specifically the relation between firms' credit ratings and cash holdings (Acharya et al. 2012; Dhaliwal et al. 2015). Our paper provides evidence that firms' credit ratings are positively associated with foreign cash holdings, and this positive association is less pronounced in firms with higher repatriation costs and in firms at the investment-grade cutoff. Our findings suggest that bond analysts generally perceive foreign cash reserves as positively

incremental to other performance measures; however, they also become more conservative in discounting the value of foreign cash reserves under certain situations.

The remainder of this paper proceeds as follows. The second section reviews the literature and develops our hypotheses. The third section discusses the research design and data description. The fourth section presents the results of testing H1, followed by the results of testing H2 in the fifth section. The sixth section reports additional test results. The final section concludes.

II. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Credit rating agencies play an important role in debt markets. When issuing debt, firms are usually concerned about credit ratings, because debt contracts and interest rates are frequently determined by their credit ratings (Graham and Harvey 2001). Given the substantial growth in the corporate bond market, it is crucial to understand the factors used in credit risk assessments.

S&P's Corporate Rating Framework (2013)[6] suggests that the S&P assesses six categories in credit risk assessment, including the diversification/portfolio effect, capital structure, financial policy, liquidity, management/governance, and comparable rating analysis. Academic research has extensively examined the factors in the abovementioned categories. Mansi and Reeb (2002) find that diversification in conglomerates enhances bondholders' value due to a reduction in firm risks. Kisgen (2006) finds that concerns about the benefits of upgrades and the costs of downgrades directly affect managers' capital structure decisions. Numerous studies show that rating agencies consider the impact of financial policy on credit rating, including financial reporting quality, accounting conservatism, the book-tax difference, off-balance sheet financing, corporate social responsibility, and employee stock option policy (Ahmed, Billings, Morton,

[6] https://www.spratings.com/documents/20184/774196/HowWeRateNonfinancialCorporateEntities_041019.pdf

and Stanford-Harris 2002; Attig et al. 2013; Ayers, Laplante, and McGuire 2010; Bao et al. 2019; Francis, LaFond, Olsson, and Schipper 2005; Jiraporn et al. 2014; Kaplan and Urwitz 1979; Lee 2008; Psillaki et al. 2010; Ziebart and Reiter 1992). Also, recent studies show that higher managerial ability and better corporate governance improve credit ratings (Ashbaugh-Skaife et al. 2006; Bhojraj and Sengupta 2003; Bonsall et al. 2016; Cornaggia et al. 2017; Kuang and Qin 2013; Liu and Jiraporn 2010).

However, compared with the abovementioned categories, liquidity is unique and may be of more importance:

> "Liquidity is an important component of credit risk across the entire rating spectrum. Unlike most other rating factors within an issuer's risk profile, a lack of liquidity could precipitate the default of an otherwise healthy entity. Accordingly, liquidity is an independent characteristic of a company, measured on an absolute basis, and the assessment is not relative to industry peers or other companies in the same rating category. The quantitative analysis of liquidity focuses on the monetary flows--the sources and uses of cash--that are the key indicators of a company's liquidity cushion." -- S&P's Corporate Rating Framework (2013)

The relation between firm liquidity and credit ratings has attracted much academic attention. However, there exists a lack of research directly examining whether rating agencies assess the sources and uses of foreign cash, probably because firms were generally not required to disclose foreign cash holdings before 2009. Starting from 2009, the SEC has been sending out comment letters to request that multinationals disclose the cash held by their foreign subsidiaries and to discuss any liquidity and/or tax consequences (Chen 2015). Since then, data on foreign cash holding have become publicly available in the "Liquidity and Capital Resources" section of 10-K filings. In line with the S&P's Corporate Rating Framework (2013), our paper takes an initial

step to examine whether information about foreign cash disclosed in the 10-K influences a company's credit rating.

There is a growing number of studies on foreign cash holdings and tax repatriation. One stream studies agency costs associated with foreign cash holdings. For example, Hanlon et al. (2015) find that tax-induced foreign investment activities are negatively viewed by the market, suggesting that foreign investment activity reflects agency-driven behavior. Chen (2015) finds that investors place a discount on foreign cash holdings because they anticipate that foreign cash holdings are less accessible, without incurring additional tax costs. Song (2018) finds that excess foreign cash holdings are negatively associated with future profitability. Another stream of literature examines multinational firms' responses to U.S. tax policy. Dong and Zhao (2018) find that repatriated earnings under the tax holiday (AJCA of 2004) increased firm spending on R&D. De Simone et al. (2018) find that, compared with firms that are unlikely to repatriate, firms that are likely to repatriate build up foreign cash holdings more, following proposals for a second tax holiday. However, the relation between foreign cash holdings and credit risks is unexplored and warrantees an empirical investigation. Note that Acharya et al. (2012) urge researchers not to overlook the endogeneity of corporate financial and investment policies when examining the relation between credit ratings and cash holdings because risker firms are likely to reserve more cash. Similarly, we take a different perspective from Dhaliwal et al. (2015) by arguing that a firm's endogenous choice of foreign cash may reveal private information.

The notion that firms can signal their ability through cash reserves is also in line with empirical evidence in the literature. For example, Gentry et al. (1985) find that cash flow patterns provide signals about a company's financial health. Beatty et al. (1997) find that firms hold unusually high cash positions to signal future investment opportunities. Ghaly et al. (2015) find

that firms hold more cash to signal their commitment to better employee welfare provisions. Signaling takes root in asymmetric information settings, where one party credibly conveys some information about itself to another party through a costly signal. The job-market signaling model in Spence (1978)'s seminal paper shows that employees may signal their ability level through acquiring costly education credentials, which enables an employer to reliably distinguish low ability workers from high ability workers. Similarly, information asymmetry arises between multinational firms and credit rating agencies in our setting, and we argue that firms may build foreign cash holdings (pledging not to repatriate foreign earnings in the foreseeable future) to credibly signal their financial health and their ability to meet domestic liquidity needs. That is, we hypothesize a positive correlation between foreign cash holdings and firms' credit ratings.

H1. Foreign cash holdings are positively associated with credit ratings.

To sustain a signaling equilibrium, a credible signal must be too costly to be imitated by a bad type. For example, an education credential in Spence (1978) 's job-market signaling model is a credible signal because it is difficult for low ability employees to obtain; thus, it is a sustainable equilibrium in which employers believe that the credential is positively correlated with an employee's ability. In other words, the key determinant for a signal's value is the differing cost structure between high ability and low ability workers, which helps prevent the bad type from mimicking the good type's behavior. Therefore, the more costly it is for a bad type to mimic a good type, the more valuable a signal is. Similarly, we conjecture that the signaling value of large foreign cash holdings is higher in financially distressed firms because they are closer to a cash shortage and it is more costly for them to accumulate foreign cash reserves, which in turn credibly signals unobservable fundamentals. Therefore, we hypothesize that financial distress strengthens the positive correlation between foreign cash holdings and firms' credit ratings.

H2. The positive correlation between foreign cash holdings and credit ratings is more pronounced in financially distressed firms.

III. RESEARCH DESIGN AND SAMPLE

Sample and data

We collect data on foreign cash holdings from firms' 10-K filings, and we obtain credit rating data and company financial data from Compustat and stock price information from CRSP. The final sample includes 2,606 firm-year observations of listed U.S. multinationals from 1999 to 2016.[7] Following prior studies (e.g., Chen 2015), we classify a firm as a multinational if it has non-missing pre-tax foreign earnings or current foreign tax expenses. Consistent with relevant literature, we use the 12 industry categories proposed by Fama and French and require at least 15 observations per industry-year grouping. We further exclude firms in utilities and regulated industries (SIC codes between 4900 and 4949) and financial services firms (SIC codes between 6000 and 6999) from our sample. Finally, we winsorize all continuous variables at the bottom and top 1 percentiles to mitigate the effects of outliers.

Following the literature, a firm's credit rating is a numerical translation of the S&P's long-term issuer credit ratings increasing in credit quality (decreasing in credit risk). The ratings range from AAA (highest rating) to D (lowest rating—debt in payment default), reflecting the S&P's assessment regarding the creditworthiness of the obligor with respect to its senior debt obligations. Following Ashbaugh-Skaife et al. (2006), we collapse the ratings into seven

[7] Our sample begins with 1999 because it is the first year in which we have a non-zero sample of foreign cash collected from firms' 10-K filings (see Appendix B for the yearly distribution of data on foreign cash). Our sample ends at 2016 because the Compustat S&P Ratings database was discontinued after February 2017.

categories (AAA, AA, A, BBB, BB, B, and others) and transform the ratings into numbers from 1 to 7 to do the following analyses.[8]

Foreign cash data are collected from firms' 10-K filings. We use Python programming language to do a keyword search in all of the 10-K reports for the period 1999-2016 that are available from the SEC's EDGAR database, and then we manually verify the data accuracy. Details about the data collection process and the yearly distribution of raw foreign cash data are discussed in Appendix B. Two things warrant a brief mention. First, we limit our sample to listed U.S. multinationals; thus, multinational firms that choose not to hold any foreign cash will not be compared with domestic firms that by definition cannot hold any foreign cash. Second, although the SEC has been sending out comment letters request multinationals to disclose the cash held by their foreign subsidiaries and to discuss any liquidity and/or tax consequences starting from 2009 (Chen 2015), the yearly distribution of raw foreign cash data shown in Appendix B suggests that many firms did not start until 2011. In other words, if a multinational firm did not disclose any foreign cash holdings before 2011, it is difficult to determine whether the missing value is because the firm had repatriated all foreign earnings or because the firm was not required to disclose such information. Therefore, we delete all firm-year observations with missing foreign cash data before 2011, while we assume that the foreign cash holding is zero (insignificant) if a multinational firm did not disclose such information after 2011.

Research design

To test H1, we examine the relation between a firm's credit rating and foreign cash holdings using the following model:

[8] All results still hold significantly if we consider plus/minus signs and transform the ratings into numbers from 1 to 21.

$$RATE_{it} = \alpha_0 + \beta_1 FCH_{it} + \beta_2 DCH_{it} + \beta_3 SIZE_{it} + \beta_4 ROA_{it} + \beta_5 LOSS_{it} + \beta_6 RE_{it} + \beta_7 LEV_{it} + \beta_8 MB_{it}$$
$$+ \beta_9 INTCOV_{it} + \beta_{10} GROWTH_{it} + \beta_{11} CAPINTEN_{it} + \beta_{12} STDROA_{it} + \beta_{13} STDRET_{it}$$
$$+ \beta_{14} WCAQ_{it} + \beta_{15} TIMELINESS_{it} + \beta_{16} ZSCORE_{it} + \varepsilon_{it} \quad (1)$$

The dependent variable *RATE* is firms' credit rating increasing in credit quality (decreasing in credit risk). The independent variable *FCH* is foreign cash holdings disclosed in the 10-K. As is argued in H1, we expect a positive association ($\beta_1 > 0$) between a firm's credit rating and foreign cash holdings. Following prior studies (e.g., Acharya et al. 2012; Ashbaugh-Skaife et al. 2006; Bao et al. 2019), we include control variables that are found to be related to a firm's credit rating. First, we control for domestic cash holdings (*DCH*). Second, we control for firm characteristics: firm size (*SIZE*), return on assets (ROA), operating loss (*LOSS*), retained earnings (*RE*), leverage (*LEV*), market-to-book ratio (*MB*), interest coverage (*INTCOV*), sales growth (*GROWTH*), capital intensity (*CAPINT*), standard deviation of ROA over the prior five years (*STDROA*), standard deviation of stock returns over the prior five years (*STDRET*), and Altman's Z-score (*ZSCORE*). Third, we include two measures to capture the transparency of firms' financial reporting: the quality of firms' working capital accruals (*WCAQ*) and the timeliness of firms' earnings (*TIMELINESS*). Finally, we include both industry and year fixed effects in the regressions. A detailed definition of all variables is summarized in Appendix A.

To test H2, we examine the joint effect of foreign cash holdings and financial distress on a firm's credit rating using the following model:

$$RATE_{it} = \alpha_0 + \beta_1 FCH_{it} + \beta_2 FCH_{it} * DISTRESSED_{it} + \beta_3 DCH_{it} + \beta_4 SIZE_{it} + \beta_5 ROA_{it} + \beta_6 LOSS_{it}$$
$$+ \beta_7 RE_{it} + \beta_8 LEV_{it} + \beta_9 MB_{it} + \beta_{10} INTCOV\_NEG_{it} + \beta_{11} GROWTH_{it}$$
$$+ \beta_{12} CAPINTEN_{it} + \beta_{13} STDROA_{it} + \beta_{14} STDRET_{it} + \beta_{15} WCAQ_{it} + \beta_{16} TIMELINESS_{it}$$
$$+ \beta_{17} ZSCORE\_NEG_{it} + \varepsilon_{it} \quad (2)$$

We use three proxies for financial distress, including loss (*LOSS*), Altman's Z-score (*ZSCORE_NEG*), and the interest coverage ratio (*INTCOV_NEG*). For the convenience of explaining the results, we multiply negative one with *ZSCORE* and *INTCOV*, respectively, to derive *ZSCORE_NEG* and *INTCOV_NEG*, so that a higher value of *DISTRESSED* indicates that a firm is more financially constrained. As is argued in H2, we expect a positive coefficient ($\beta_2 > 0$) for the interaction term *FCH* DISTRESSED*, suggesting that the positive correlation between *RATE* and *FCH* is more pronounced in financially distressed firms.

Descriptive statistics and correlation

Table 1 presents the descriptive statistics for the variables we use in Models (1) and (2). The total number of firm-year observations is 2,606, with an average credit rating of 3.359 implying a debt rating in the BB+ and BBB- range. On average, companies have a foreign cash of 0.041 (equivalent to $420.78 million), a domestic cash of 0.059 (equivalent to $593.77 million), a market-to-book ratio of 3.349, a leverage ratio of 0.341, a return of assets ratio of 0.035, a retained earnings ratio of 0.114, a growth in sales of 0.059, a size of 8.518 (equivalent to total assets of $5 billion), and a capital intensity of 0.536. A total of 20.5 percent of the companies are unprofitable. Companies have an average Altman's Z-score of 2.645, an interest coverage ratio of 14.768, working capital accruals of 0.033, and a timeliness of earnings of -0.108. Lastly, the means of the companies' standard deviation of the ROA and stock returns over the prior five years are 0.049 and 0.390, respectively.

Table 2 provides Pearson correlations for the variables in Models (1) and (2). We find that the correlations between each of the firm characteristics and *RATE* are in the predicted directions, consistent with prior literature, and all correlations are statistically significant at the 0.05 level or better. Specifically, *FCH, SIZE, ROA, RE, MB, INTCOV, WCAQ, TIMELINESS*,

and *ZSCORE* are positively correlated with credit ratings; whereas *DCH, LOSS, LEV, GROWTH, CAPINTEN, STDROA*, and *STDRET* are negatively correlated with credit ratings. Further, the small correlations between our variable of interest *FCH* and the control variables suggest that the models are unlikely to be subject to multicollinearity. Nonetheless, we check the variance inflation factor (VIF) of each variable in all of our tests to quantitatively measure possible multicollinearity. The VIF's are all below 4, which is well below the threshold of 10 suggested by Kennedy (2008).

IV. EMPIRICAL RESULTS

Test of H1

Table 3 reports the multivariate results on the association between a firm's credit rating and foreign cash holdings in Model (1). We find that the coefficient on foreign cash holdings (*FCH*) is positive and statistically significant ($\beta_1 = 1.862$; $p < 0.01$), consistent with the prediction of H1, indicating that firms with greater foreign cash holdings tend to have better credit ratings. To highlight the economic significance of the *FCH* coefficient estimate, a one-standard deviation increase in foreign cash holdings would lead to a 0.47-rating-notch increase in firms' credit rating. This result suggests that credit agencies perceive foreign cash holding as a positive factor, since it may signal healthy fundamentals.

With respect to the control variables, we find that domestic cash holding (*DCH*) is negative and significantly associated with credit ratings, which suggests that credit agencies perceive domestic cash holding as a negative signal for firms' healthy fundamentals. This finding is consistent with Acharya et al. (2012)'s argument that risker firms are likely to reserve more (domestic) cash. Consistent with prior literature (e.g., Acharya et al. 2012; Ashbaugh-Skaife et al. 2006; Bao et al. 2019), firm size (*SIZE*), retained earnings (*RE*), interest coverage (*INTCOV*),

Altman's Z-score (*ZSCORE*), and the transparency of firms' financial reporting (i.e., measured as *WCAQ* and *TIMELINESS*) are positively and significantly associated with credit ratings; while loss (*LOSS*), the leverage ratio (*LEV*), sales growth (*GROWTH*), and the standard deviation of stock returns (*STDRET*) are negatively and significantly related to credit ratings.

Change analysis

In order to further identify whether incremental foreign cash holdings drive changes in a company's credit rating, we use a "change regression" as follows:

$$\begin{aligned}\Delta RATE_{it} = {} & \alpha_0 + \beta_1 (\Delta FCH_{it}) + \beta_2 (\Delta DCH_{it}) + \beta_3 (\Delta SIZE_{it}) + \beta 4 (\Delta ROA_{it}) + \beta_5 (\Delta LOSS_{it}) \\ & + \beta 6 (\Delta RE_{it}) + \beta 7 (\Delta LEV_{it}) + \beta 8 (\Delta MB_{it}) + \beta 9 (\Delta INTCOV_{it}) + \beta 10 (\Delta GROWTH_{it}) \\ & + \beta 11 (\Delta CAPINTEN_{it}) + \beta 12 (\Delta STDROA_{it}) + \beta 13 (\Delta STDRET_{it}) + \beta 14 (\Delta WCAQ_{it}) \\ & + \beta 15 (\Delta TIMELINESS_{it}) + \beta 16 (\Delta ZSCORE_{it}) + \varepsilon_{it} \qquad (3)\end{aligned}$$

Table 4 reports the results in Model (3) using *ΔRATE* as the dependent variable, where *ΔRATE* is the change in credit ratings from year *t-1* to *t*. The independent variable, *ΔFCH*, and all control variables are measured as the change variables from year *t-1* to *t*, respectively. We find that the coefficient on *ΔFCH* is positive and statistically significant ($\beta_1 = 4.660$; $p < 0.01$), suggesting that an increase in incremental foreign cash holdings leads to higher incremental credit ratings. This result further demonstrates the positive relation between firms' foreign cash holdings and credit ratings. In addition, we find that an increase in firm size (*SIZE*) or retained earnings (*RE*) is positively related to an upgrade in ratings, whereas an increase in the leverage ratio (*LEV*) is related to a downgrade.

Investment grade vs. speculative grade

Following Ashbaugh-Skaife et al. (2006), we use an alternative classification scheme to partition credit ratings into an investment grade and a speculative grade so as to overcome the

difficulty in quantifying the marginal effects of changes in foreign cash holdings on credit ratings with multiple categories. Thus, we re-examine H1, Model (1), using *INVESTGRADE* as the dependent variable, where *INVESTGRADE* is coded as one if the firm's credit rating is BBB- or better, and zero otherwise.

Table 5 reports the results. We find that the coefficient on foreign cash holdings (*FCH*) is positive and statistically significant ($\beta_1 = 3.423$; $p < 0.05$), suggesting that foreign cash holdings are positively associated with the likelihood of being classified as investment grade. The remaining results are similar to the results in Table 3, and we also find that *INVESTGRADE* is positively correlated to *ROA* ($p < 0.01$) and negatively correlated to *STDROA* ($p < 0.01$).

V. TEST OF H2

Table 6 reports the results on the joint effect of foreign cash holdings and financial distress on a firm's credit rating in Model (2). Columns (1), (2), and (3) present the regression results with *ZSCORE_NEG, INTCOV_NEG,* and *LOSS*, respectively, as proxies for financial distress (*DISTRESSED)*. Consistent with the prediction of H2, we find that the coefficients for each interaction term *FCH* * *DISTRESSED* are positive and statistically significant ($p < 0.01$ in Columns 1 and 2, and $p < 0.05$ in Column 3), meaning that the positive correlation between foreign cash holdings and credit ratings is more pronounced in loss-making firms, in firms with a low Altman's Z-score, and in firms with a low interest coverage ratio. These results suggest that the escalated signaling costs in these three types of distressed firms strengthen the positive impact of foreign cash holdings on credit rating assessments. The coefficients on foreign cash holdings (*FCH*) in all three columns are positive and statistically significant ($p < 0.01$), consistent with the prediction of H1 that firms with greater foreign cash holdings tend to have

better credit ratings. The coefficients on the control variables are similar to those reported in Table 3.

VI. ADDITIONAL ANALYSIS

Endogeneity

A potential concern for the research design is endogeneity. First, the relationship between foreign cash holdings and credit ratings may be subject to an omitted variable problem. Second, it is possible that a reverse causality story could explain our results. For example, firms with high credit ratings may have more access to the debt market, and thus, are likely able to hold more cash overseas. Third, simultaneity bias may arise if the foreign cash holdings and credit ratings are codetermined, with each affecting the other. Following prior literature (Dharmapala, Foley, and Forbes 2011; Dong and Zhao 2018; Larcker and Rusticus 2010), we adopt the two-stage-least-squares (2SLS) approach with an exogenous instrumental variable (IV) to mitigate endogeneity issues. Empirically, a good instrument should be strongly correlated with the endogenous variable *FCH*, but should be uncorrelated with the error term, and thus, posts no direct impact on the dependent variable *RATE*. Following Dharmapala et al. (2011) and Dong and Zhao (2018), we use *TAXHAVEN* as IV in this study: on one hand, *TAXHAVEN* affects *FCH* because multinationals are likely to take advantage of the reduced tax rate in tax haven jurisdictions, and thus, increase foreign cash holdings; on the other hand, there is no obvious reason to expect that *TAXHAVEN* would affect *RATE* in ways other than through its impact on *FCH*. Next, we re-evaluate H1 and H2 with the 2SLS regressions.

Table 7 reports the results for the 2SLS. The regressions include the same control variables as those shown in Table 3, as well as industry and year fixed effects. Column (1) presents the results for the first stage. As expected, we find that the coefficient for *TAXHAVEN* is

significantly positive ($\beta_1 = 0.001$; $p < 0.01$), implying that firms with more subsidiaries located in tax haven jurisdictions are more likely to have a greater amount of foreign cash holdings. In the second stage, we use the estimated *FCH* obtained from the first stage. The second-stage result for H1 is presented in Column (2), and the second-stage results for H2 are reported in Columns (3) - (5). In Column (2), the coefficient for *FCH* is significantly positive ($p < 0.01$), consistent with the prediction of H1, suggesting that the positive correlation between foreign cash holding and credit rating is robust to endogeneity concerns. In Columns (3) - (5), the coefficients for the interaction term *FCH*DISTRESSED* are significantly positive ($p < 0.01$ in Columns (3) and (5), and $p < 0.05$ in Column (4)), consistent with the prediction of H2, supporting our hypothesis that financial distress strengthens the signaling effect of foreign cash holding.

Tax repatriation costs

Both tax rules and financial reporting rules provide firms with incentives to defer repatriation, and thus, hold a substantial amount of unremitted foreign earnings in the form of cash; however, foreign cash holdings cannot be deployed by U.S. parent companies without incurring repatriation taxes (Bryant-Kutcher, Eiler, and Guenther 2008; Chen 2015; Edwards, Kravet, and Wilson 2016; Hanlon et al. 2015). Therefore, in the case of domestic cash shortages (i.e., when a firm must repatriate), the higher the repatriation costs are, the more repatriation taxes the firm must pay. Thus, we conjecture that rating agencies discount the value of the foreign cash holdings of firms with high repatriation costs, and we examine whether the potential repatriation costs on foreign source income affect the correlation between firms' credit ratings and foreign cash holdings using the following regression model:

$$RATE_{it} = \alpha_0 + \beta_1 FCH_{it} + \beta_2 FCH_{it} * REPCOST_{it} + \beta_3 REPCOST_{it} + \beta_4 DCH_{it} + \beta_5 SIZE_{it}$$
$$+ \beta_6 ROA_{it} + \beta_7 LOSS_{it} + \beta_8 RE_{it} + \beta_9 LEV_{it} + \beta_{10} MB_{it} + \beta_{11} INTCOV\_NEG_{it}$$

$$+ \beta_{12} GROWTH_{it} + \beta_{13} CAPINTEN_{it} + \beta_{14} STDROA_{it} + \beta_{15} STDRET_{it} + \beta_{16} WCAQ_{it}$$

$$+ \beta_{17} TIMELINESS_{it} + \beta_{18} ZSCORE\_NEG_{it} + \varepsilon_{it} \quad (4)$$

Table 6 reports the results of Model (4). *REPCOST* is a continuous variable measuring the repatriation tax costs. Following Foley, Hartzell, Titman, and Twite (2007), we estimate repatriation costs in two measures: *REPCOST_1* and *REPCOST_2* (see Appendix A for the definition and calculation). Our focus is the coefficient β_2 for the interaction term *FCH* * *REPCOST*. We predict a significantly negative correlation, suggesting that the higher repatriation costs weaken the positive correlation between foreign cash holdings and credit ratings. Consistent with our prediction, we find that the coefficients on the interaction term *FCH* * *REPCOST* are negative and statistically significant ($p < 0.01$ in Column 1 and $p < 0.05$ in Column 2). Also, we find that the coefficients on foreign cash holdings (*FCH*) are positive and statistically significant in both Column 1 ($\beta_1 = 2.214$; $p < 0.01$) and Column 2 ($\beta_1 = 2.268$; $p < 0.01$). These results suggest that rating agencies are more conservative in discounting the value of foreign cash holdings when these holdings are located in low-tax countries and are subject to more taxation upon repatriation. The coefficients for the control variables are similar to those reported in Table 3.

One additional element deserves subtler consideration. At first sight, it sounds natural that higher repatriation costs may strengthen the signaling effect of foreign cash holding because repatriation costs discount the value of foreign cash holdings that can potentially be used to meet domestic liquidity, which may convey firms' confidence in their financial condition. However, this argument is misleading because it overlooks the fact that firms will not pay more than what

they pay if they repatriate now.[9] In other words, compared with firms having low repatriation costs, there is no additional cost (other than the repatriation taxes that they are supposed to pay) associated with holding a great amount of foreign cash; thus, high repatriation costs do not increase the penalty for a bad-type firm holding foreign cash to mimic a good-type firm. Thus, we do not observe repatriation costs strengthening the signaling effect of foreign cash holdings. In contrast, the financial distress that we discussed in H2 significantly increases the penalty of a bad-type firm mimicking a good-type firm because financially distressed firms suffer more if they experience cash shortages or liquidity shocks. Thus, the escalated signaling costs in financially distressed firms strengthen the positive correlation between foreign cash holding and credit rating.

Reputational concerns

We next explore whether the positive correlation between foreign cash holdings and credit ratings is affected by rating agencies' reputation concerns when they assess bonds at the threshold of an investment grade. The investment-grade cutoff is particularly important because certain investors have the restriction of investing only in investment-grade bonds (Kraft 2015). For the S&P's long-term issuer credit ratings, the company must be rated as BBB- or better, in order to be considered as investment grade. Thus, we follow Kraft (2015) in considering BBB- as the investment-grade cutoff.

Naturally, all bond issuers desire investment-grade ratings to obtain a large investor base. However, rating agencies are likely more conservative at the investment-grade cutoff because of reputational concerns; reputation is rating agencies' primary asset, which serves as the basis for their long-term business prospects (Klein and Leffler 1981; Shapiro 1983; Kraft 2015).

[9] If they anticipate a tax holiday in the near future, they will pay less; otherwise, they will pay the same amount of repatriation tax as of today.

Therefore, we predict that rating agencies discount the value of foreign cash holdings more at the investment-grade cutoff, and we examine whether reputational concerns weaken the positive correlation between credit ratings and foreign cash holdings using the following regression model:

$$RATE_{it} = \alpha_0 + \beta_1 FCH_{it} + \beta_2 FCH_{it} * THRESHOLD_{it} + \beta_3 THRESHOLD_{it} + \beta_4 DCH_{it} + \beta_5 SIZE_{it} + \beta_6 ROA_{it} + \beta_7 LOSS_{it} + \beta_8 RE_{it} + \beta_9 LEV_{it} + \beta_{10} MB_{it} + \beta_{11} INTCOV\_NEG_{it} + \beta_{12} GROWTH_{it} + \beta_{13} CAPINTEN_{it} + \beta_{14} STDROA_{it} + \beta_{15} STDRET_{it} + \beta_{16} WCAQ_{it} + \beta_{17} TIMELINESS_{it} + \beta_{18} ZSCORE\_NEG_{it} + \varepsilon_{it} \quad (5)$$

Table 9 reports the results in Model (5). *THRESHOLD* is an indicator variable for firms' credit ratings of BBB-. Our focus is the coefficient β_2 for the interaction term *FCH* THRESHOLD*. We predict a significantly negative correlation, suggesting that reputational concerns at the investment-grade cutoff weaken the positive correlation between foreign cash holdings and credit ratings. Consistent with our prediction, we find that the coefficient for the interaction term *FCH* THRESHOLD* is negative and statistically significant ($\beta_2 = -2.594$; $p < 0.05$). Also, we find that the coefficient on foreign cash holdings (*FCH*) is significantly positive ($\beta_1 = 2.259$; $p < 0.01$), consistent with the prediction of H1. One additional element warrants brief mention. When *THRESHOLD* is present, the coefficient on *FCH* is negative (i.e., $\beta_1 + \beta_2 = -0.335$), but not significantly different from zero ($z = -0.26$; $p = 0.793$). This finding indicates that the positive association between foreign cash holdings and credit ratings has been weakened to a level that is not distinguishable from zero, suggesting that rating agencies are conservative in considering the signaling effect of foreign cash holdings when firms are at the investment-grade cutoff.

VII. CONCLUSION

This paper examines whether credit rating agencies consider foreign cash holdings when assessing an entity's overall creditworthiness and its capacity to meet its financial obligations. We find that foreign cash holding is positively associated with credit rating, suggesting that credit agencies positively perceive foreign cash holding, which may credibly signal firms' fundamentals. Also, we find that the positive correlation is much stronger in finally distressed firms, suggesting that the escalated signaling costs in financially distressed firms strengthen the positive impact of foreign cash holdings on credit rating assessments. In further analyses, we show that our results continue to hold for an instrumental variable approach, reducing the likelihood of our results being purely driven by selection bias issues or omitted variables. We also find that the positive association between foreign cash holdings and firms' credit ratings is weakened when multinational firms are at the investment-grade cutoff and/or are subject to higher repatriation costs, implying that rating agencies are more conservative in discounting the value of foreign cash holdings in these two situations.

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Table 1. Descriptive Statistics

Variables	N	Mean	Std. Dev.	Q1	Median	Q3
RATE	2,606	3.359	1.073	3.000	3.000	4.000
FCH	2,606	0.041	0.362	0.000	0.000	0.028
DCH	2,606	0.059	0.074	0.015	0.047	0.095
SIZE	2,606	8.518	1.287	7.611	8.374	9.361
ROA	2,606	0.035	0.079	0.011	0.043	0.075
LOSS	2,606	0.205	0.403	0.000	0.000	0.000
RE	2,606	0.114	0.465	-0.050	0.173	0.378
LEV	2,606	0.341	0.186	0.208	0.313	0.445
MB	2,606	3.349	8.013	1.404	2.378	3.970
INTCOV	2,606	14.768	21.402	5.252	9.088	15.512
GROWTH	2,606	0.059	0.201	-0.029	0.037	0.114
CAPINTEN	2,606	0.536	0.399	0.219	0.422	0.792
STDROA	2,606	0.049	0.063	0.015	0.028	0.055
STDRET	2,606	0.390	0.311	0.195	0.306	0.466
WCAQ	2,606	0.033	0.039	0.015	0.035	0.054
TIMELINESS	2,606	-0.108	0.193	-0.114	-0.037	-0.008
ZSCORE	2,606	2.645	1.845	1.526	2.483	3.565

Table 1 presents the descriptive statistics for variables used in the analyses. See Appendix A for variable definitions.

Table 2. Pearson Correlation Coefficients

Variables		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
RATE	A	**1.00**																
FCH	B	**0.26**	**1.00**															
DCH	C	**-0.18**	**-0.50**	**1.00**														
SIZE	D	**0.63**	0.16	**-0.17**	**1.00**													
ROA	E	**0.43**	**0.20**	**-0.04**	**0.21**	**1.00**												
LOSS	F	**-0.36**	**-0.13**	**0.04**	**-0.20**	**-0.70**	**1.00**											
RE	G	**0.52**	0.11	**-0.03**	**0.24**	**0.46**	**-0.41**	**1.00**										
LEV	H	**-0.41**	**-0.16**	0.00	**-0.22**	**-0.24**	**0.25**	**-0.41**	**1.00**									
MB	I	**0.10**	0.00	0.04	**0.06**	**0.10**	**-0.07**	**0.09**	-0.01	**1.00**								
INTCOV	J	**0.41**	**0.24**	**-0.07**	**0.19**	**0.35**	**-0.22**	**0.30**	**-0.44**	**0.05**	**1.00**							
GROWTH	K	**-0.10**	-0.03	-0.00	**-0.04**	**0.13**	**-0.09**	-0.01	**0.05**	**0.05**	**0.03**	**1.00**						
CAPINTEN	L	**-0.15**	**-0.20**	0.019	**-0.07**	**-0.20**	**0.17**	**-0.15**	**0.17**	**-0.06**	**-0.12**	**-0.16**	**1.00**					
STDROA	M	**-0.32**	-0.05	**0.10**	**-0.24**	**-0.31**	**0.28**	**-0.42**	**0.18**	**-0.06**	**-0.12**	0.01	**0.13**	**1.00**				
STDRET	N	**-0.40**	-0.08	**0.09**	**-0.28**	**-0.18**	**0.18**	**-0.32**	**0.14**	-0.02	**-0.14**	**0.08**	**0.16**	**0.35**	**1.00**			
WCAQ	O	**0.16**	0.09	0.01	**0.12**	**0.06**	-0.02	**0.08**	-0.05	**0.05**	**0.08**	**-0.18**	**0.08**	-0.03	**-0.10**	**1.00**		
TIMELINESS	P	**0.31**	0.06	-0.03	**0.20**	**0.28**	**-0.28**	**0.25**	**-0.18**	0.02	**0.11**	-0.01	**-0.18**	**-0.22**	**-0.35**	-0.01	**1.00**	
ZSCORE	Q	**0.50**	**0.22**	0.01	**0.11**	**0.63**	**-0.44**	**0.68**	**-0.49**	**0.15**	**0.50**	**0.04**	**-0.23**	**-0.28**	**-0.22**	**0.12**	**0.23**	**1.00**

Table 2 presents the Pearson correlation matrix. The **bold** numbers are significant at the 5% level or better.
See Appendix A for variable definitions.

Table 3. Regression analysis, H1

Variables	Parameter estimates
FCH	**1.862*** **
	(3.18)
DCH	-0.944***
	(-3.88)
SIZE	0.721***
	(29.12)
ROA	0.519
	(0.96)
LOSS	-0.285***
	(-3.25)
RE	0.623***
	(7.60)
LEV	-0.628***
	(-3.63)
MB	0.004
	(1.43)
INTCOV	0.007***
	(6.12)
GROWTH	-0.899***
	(-6.70)
CAPINTEN	-0.036
	(-0.50)
STDROA	-0.376
	(-0.84)
STDRET	-0.819***
	(-9.17)
WCAQ	2.181***
	(3.56)
TIMELINESS	0.629***
	(4.49)
ZSCORE	0.226***
	(8.91)
Year fixed effects	Yes
Industry fixed effects	Yes
N	2,606
Pseudo R^2	0.3818

Table 3 presents the results from the estimation of the following ordered probit model:

$RATE=\beta_0 + \beta_1 * FCH + \sum \beta_i * Controls + \varepsilon$

See Appendix A for variable definitions. The values in parentheses are *z*-values.
***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 4. Change regression for H1

Variables	Parameter estimates
ΔFCH	4.660***
	(2.58)
ΔDCH	0.830
	(0.59)
ΔSIZE	1.114***
	(3.47)
ΔROA	-1.621*
	(-1.94)
ΔLOSS	0.253
	(1.56)
ΔRE	1.411***
	(2.95)
ΔLEV	-3.124***
	(-3.09)
ΔMB	0.003
	(0.38)
ΔINTCOV	0.001
	(1.10)
ΔGROWTH	0.109
	(0.42)
ΔCAPINTEN	0.548
	(0.72)
ΔSTDROA	-1.336
	(-1.17)
ΔSTDRET	-0.494
	(-1.47)
ΔWCAQ	0.296
	(0.34)
ΔTIMELINESS	-0.106
	(-0.96)
ΔZSCORE	-0.148
	(-1.62)
Year fixed effects	Yes
Industry fixed effects	Yes
N	1,269
Pseudo R^2	0.0745

Table 4 presents the results from the estimation of the following change model:

$$\Delta RATE=\beta_0 + \beta_1 * \Delta FCH+ \sum \beta_i * \Delta Controls + \varepsilon$$

See Appendix A for variable definitions. The values in parentheses are *z*-values.
***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 5. Investment grade vs. speculative grade analysis

Variables	Parameter estimates
FCH	**3.423****
	(2.10)
DCH	-2.318**
	(-2.35)
SIZE	1.624***
	(19.38)
ROA	6.599***
	(3.48)
LOSS	0.458*
	(1.73)
RE	1.708***
	(6.48)
LEV	-2.535***
	(-4.84)
MB	0.007
	(0.93)
INTCOV	-0.004
	(-1.10)
GROWTH	-2.215***
	(-4.99)
CAPINTEN	-0.054
	(-0.25)
STDROA	-4.301***
	(-2.76)
STDRET	-2.234***
	(-6.83)
WCAQ	3.724**
	(2.09)
TIMELINESS	0.807
	(1.59)
ZSCORE	0.456***
	(5.86)
Year fixed effects	Yes
Industry fixed effects	Yes
N	2,606
Pseudo R^2	0.5306

Table 5 presents the results from the estimation of the following logit model:

$$INVESTGRADE=\beta_0 + \beta_1 * FCH+ \sum \beta_i *Controls + \varepsilon$$

See Appendix A for variable definitions. The values in parentheses are *z*-values. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 6. Regression analysis, H2

Variables	(1) *ZSCORE_NEG*	(2) *INTCOV_NEG*	(3) *LOSS*
FCH	4.439***	0.3858***	1.591***
	(5.49)	(4.35)	(2.66)
FCH * DISTRESSED	**0.667*****	**0.044*****	**4.468****
	(4.63)	**(5.49)**	**(2.35)**
DCH	-1.553***	-1.946***	-0.974***
	(-5.61)	(-6.38)	(-4.00)
SIZE	0.726***	0.728***	0.720***
	(29.23)	(29.25)	(29.09)
ROA	0.324	0.438	0.507
	(0.60)	(0.81)	(0.94)
LOSS	-0.274***	-0.277***	-0.354***
	(-3.11)	(-3.15)	(-3.82)
RE	0.615***	0.601***	0.625***
	(7.47)	(7.30)	(7.61)
LEV	-0.573***	-0.600***	-0.606***
	(-3.30)	(-3.45)	(-3.49)
MB	0.004	0.004	0.004
	(1.41)	(1.51)	(1.37)
INTCOV NEG	-0.008***	-0.01***	-0.007***
	(-6.52)	(-7.83)	(-6.20)
GROWTH	-0.905***	-0.924***	-0.891***
	(-6.72)	(-6.86)	(-6.63)
CAPINTEN	-0.035	-0.043	-0.041
	(-0.48)	(-0.59)	(-0.57)
STDROA	-0.315	-0.266	-0.372
	(-0.70)	(-0.59)	(-0.83)
STDRET	-0.814***	-0.813***	-0.818***
	(-9.09)	(-9.09)	(-9.16)
WCAQ	2.304***	2.370***	2.176***
	(3.75)	(3.86)	(3.55)
TIMELINESS	0.600***	0.597***	0.623***
	(4.26)	(4.24)	(4.44)
ZSCORE NEG	-0.270***	-0.242***	-0.228***
	(-9.96)	(-9.43)	(-8.95)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
N	2,606	2,606	2,606
Pseudo R^2	0.3846	0.3858	0.3825

Table 6 presents the results from the estimation of the following ordered probit model:

$$RATE=\beta_0 + \beta_1 * FCH +\beta_2 * FCH * DISTRESSED +\beta_3 * DISTRESSED + \sum \beta_i * Controls + \varepsilon$$

See Appendix A for variable definitions. The values in parentheses are *z*-values.
***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 7. Instrumental Variable

	Stage 1	Stage 2: Test H1	Stage 2: Test H2		
Variables	(1)	(2)	(3) *ZSCORE_NEG*	(4) *INTCOV_NEG*	(5) *LOSS*
FCH		**13.040*** **	**14.392*** **	**13.769*** **	**12.837*** **
		(4.96)	**(5.74)**	**(5.38)**	**(4.79)**
FCH * DISTRESSED			**0.504*** **	**0.042** **	**3.799** **
			(2.95)	**(2.37)**	**(2.42)**
DCH		-1.326***	-1.513***	-1.450***	-1.377***
		(-3.44)	(-3.64)	(-3.57)	(-3.50)
TAXHAVEN	**0.001*** **				
	(3.63)				
SIZE	0.004***	0.440***	0.464***	0.452***	0.441***
	(4.15)	(3.55)	(3.68)	(3.62)	(3.56)
ROA	0.081***	-0.390	-0.495	-0.420	-0.385
	(3.15)	(-0.62)	(-0.80)	(-0.67)	(-0.61)
LOSS	-0.001	-0.169*	-0.169*	-0.172*	-0.228**
	(-0.15)	(-1.88)	(-1.88)	(-1.91)	(-2.33)
RE	-0.004	0.493***	0.507***	0.490***	0.495***
	(-1.14)	(4.41)	(4.53)	(4.44)	(4.41)
LEV	0.011	-0.659***	-0.636***	-0.677***	-0.641***
	(1.38)	(-3.70)	(-3.62)	(-3.78)	(-3.62)
MB	-0.0003**	0.007***	0.007***	0.007***	0.007***
	(-2.10)	(2.74)	(2.73)	(2.73)	(2.68)
INTCOV_NEG	-0.0002***	-0.003	-0.003*	-0.004*	-0.003
	(-3.53)	(1.55)	(-1.74)	(-1.90)	(-1.59)
GROWTH	-0.019***	-0.385*	-.409*	-0.398*	-0.380*
	(-3.11)	(-1.67)	(-1.75)	(-1.72)	(-1.66)
CAPINTEN	-0.015***	0.168*	0.163*	0.169*	0.163*
	(-4.52)	(1.90)	(1.80)	(1.89)	(1.83)
STDROA	0.049**	-0.963**	-0.951**	-0.956**	-0.960**
	(2.33)	(-2.24)	(-2.18)	(-2.21)	(-2.23)

STDRET	0.004	-0.613***	-0.631***	-0.627***	-0.615***
	(1.10)	(-4.56)	(-4.70)	(-4.64)	(-4.57)
WCAQ	0.036	1.225*	1.339*	1.263*	1.233*
	(1.25)	(1.65)	(1.77)	(1.69)	(1.66)
TIMELINESS	-0.009	0.617***	0.616***	0.616***	0.612***
	(-1.48)	(4.00)	(4.04)	(4.02)	(3.99)
ZSCORE_NEG	-0.005***	-0.090*	-0.126**	-0.100*	-0.091*
	(-4.68)	(1.63)	(-2.03)	(1.76)	(-1.65)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
N	2,585	2,585	2,585	2,585	2,585
Adj. R^2	0.2234				
Pseudo R^2		0.3850	0.3872	0.3861	0.3861

Table 7 presents estimates of the instrumental variables methods using two-stage least squares (2SLS) panel regressions.

In Stage 1, we regress *FCH* on *TAXHAVEN* and the controls in Column (1); *t*-statistics are reported in parentheses.

In Stage 2, we use estimated *FCH* from Stage 1 to test H1 in Column (2), and test H2 in Column (3)-(5); *z*-values are reported in parentheses.

See Appendix A for variable definitions. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 8. Repatriation costs

Variables	(1) *REPCOST_1*	(2) *REPCOST_2*
FCH	2.214***	2.268***
	(2.85)	(2.74)
FCH * REPCOST	**-0.110*****	**-0.101****
	(**-2.91**)	(**-2.53**)
REPCOST	-0.137	-0.413
	(-0.44)	(-1.40)
DCH	-1.756***	-1.728***
	(-4.43)	(-4.30)
SIZE	0.755***	0.755***
	(25.27)	(25.31)
ROA	0.302	0.482
	(0.43)	(0.69)
LOSS	-0.138	-0.131
	(-1.25)	(-1.18)
RE	0.807***	0.790***
	(7.68)	(7.53)
LEV	-0.702***	-0.710***
	(-3.19)	(-3.23)
MB	0.008**	0.008**
	(2.26)	(2.11)
INTCOV	0.010***	0.010***
	(5.76)	(5.73)
GROWTH	-0.897***	-0.894***
	(-5.01)	(-5.00)
CAPINTEN	-0.168*	-0.174**
	(-1.90)	(-1.97)
STDROA	-1.471**	-1.395**
	(-2.13)	(-2.02)
STDRET	-0.861***	-0.869***
	(-7.54)	(-7.61)
WCAQ	1.813**	1.836**
	(2.45)	(2.48)
TIMELINESS	0.661***	0.660***
	(3.49)	(3.49)
ZSCORE	0.214***	0.211***
	(6.79)	(6.74)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
N	1,865	1,865
Pseudo R^2	0.3808	0.3810

Table 8 presents the results from the estimation of the following ordered probit model:

$$RATE=\beta_0 + \beta_1 * FCH +\beta_2 * FCH * REPCOST +\beta_3 * REPCOST + \sum \beta_i * Controls + \varepsilon$$

See Appendix A for variable definitions. The values in parentheses are *z*-values.
***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 9. Reputation concerns

Variables	parameter estimates
FCH	2.259***
	(3.71)
FCH * THRESHOLD	-2.594**
	(-2.01)
THRESHOLD	0.865***
	(9.85)
DCH	-0.851***
	(-3.49)
SIZE	0.735***
	(29.32)
ROA	0.448
	(0.83)
LOSS	-0.315***
	(-3.56)
RE	0.666***
	(8.05)
LEV	-0.471***
	(-2.69)
MB	0.004
	(1.35)
INTCOV	0.008***
	(6.83)
GROWTH	-0.891***
	(-6.60)
CAPINTEN	-0.022
	(-0.31)
STDROA	-0.403
	(-0.89)
STDRET	-0.797***
	(-8.85)
WCAQ	2.132***
	(3.46)
TIMELINESS	0.629***
	(4.45)
ZSCORE	0.226***
	(8.84)
Year fixed effects	Yes
Industry fixed effects	Yes
N	2,606
Pseudo R^2	0.3846

Table 9 presents the results from the estimation of the following ordered probit model:

$$RATE=\beta_0 + \beta_1 * FCH +\beta_2 * FCH * THRESHOLD +\beta_3 * THRESHOLD + \sum \beta_i * Controls + \varepsilon$$

See Appendix A for variable definitions. The values in parentheses are *z*-values.
***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Appendix A: Variable Definitions

Variables	Definitions
CAPINTEN	Capital intensity, measured as gross PPE divided by total assets.
ΔCAPINTEN	Change in CAPINTEN from year t-1 to year t.
DCH	Domestic cash, measured as ln[(Total cash-foreign cash)/total assets +1].
ΔDCH	Change in DCH from year t-1 to year t.
FCH	Foreign cash (from 10-K), measured as ln(foreign cash/total assets+1).
ΔFCH	Change in FCH from year t-1 to year t.
GROWTH	Sales growth, calculated as a percentage change in sales.
ΔGROWTH	Change in GROWTH from year t-1 to year t.
INTCOV	Interest coverage, measured as operating income before depreciation and interest expense divided by interest expense.
ΔINTCOV	Change in INTCOV from year t-1 to year t.
INTCOV_NEG	Negative one times INTCOV.
INVESTGRADE	An indicator variable that equals 1 if firm credit ratings (RATE) is BBB- or better, and 0 otherwise.
LEV	Leverage, measured as total debt divided by total assets.
ΔLEV	Change in LEV from year t-1 to year t.
LOSS	An indicator variable that equals 1 if net income before extraordinary items is negative, and 0 otherwise.
ΔLOSS	Change in LOSS from year t-1 to year t.
MB	Market-to-book ratio, measured as the market value of equity divided by the book value of equity.
ΔMB	Change in MB from year t-1 to year t.
RATE	Long-term issuer credit ratings compiled by Standard & Poor's.
RE	Retained earnings divided by total assets.
ΔRE	Change in RE from year t-1 to year t.
REPCOST_1	Repatriation Cost, measured as (pre-tax income * marginal tax rate -current foreign income tax expense)*100/|pre-tax income|, where the marginal tax rate is developed and provided by Professor John Graham (http://faculty.fuqua.duke.edu/~jgraham/).
REPCOST_2	Similar to REPCOST_1, but using the U.S. corporate statutory tax rate instead of the marginal tax rate.
ROA	Return on assets, measured as net income before extraordinary items divided by total assets.
ΔROA	Change in ROA from year t-1 to year t.
SIZE	Firm size, measured as the natural logarithm of total assets.
ΔSIZE	Change in SIZE from year t-1 to year t.
STDRET	Standard deviation of daily stock returns over the past five years.
ΔSTDRET	Change in STDRET from year t-1 to year t.
STDROA	Standard deviation of ROAs over the past five years.
ΔSTDROA	Change in STDROA from year t-1 to year t.
TAXHAVEN	The number of tax haven jurisdictions in which firms have foreign subsidiaries (from Exhibit-21 of the 10-K).

THRESHOLD	An indicator variable that equals 1 if a firm's credit rating (RATE) is BBB-, and 0 otherwise.
TIMELINESS	Negative one times the squared residual from the following regression $RET=b_0+b_1(NIBX)+b_2(LOSS)+b_3(NIBX*LOSS)+b_4(\Delta NIBX)+\varepsilon$, where the regression is estimated by three-, two-, or one-digit SIC codes conditional on having at least 10 firms in each SIC group. RET=the market-adjusted return over the fiscal year; NIBE=net income before extraordinary items scaled by the beginning of the period market value of equity; LOSS=one if NIBE is negative, and zero otherwise; DNIBE=the change in net income before extraordinary items scaled by the beginning of the period market value of equity.
ΔTIMELINESS	Change in TIMELINESS from year t-1 to year t.
WCAQ	Negative one times the standard deviation of the firm-specific residual from the prior 3-5 years, where residuals are from the following cross-sectional estimation of Dechow and Dichev's (2002) model: $WCA_t=\beta_0+\beta_1 CFO_{t-1}+\beta_2 CFO_t+\beta_3 CFO_{t+1}+\varepsilon$, where regressions are estimated by three-, two-, or one-digit SIC codes conditional on having at least 10 firms in each SIC group. Working Capital Accruals (WCA)=(change in current assets−change in cash−change in current liabilities+change in debt in current liabilities +change in income taxes payable)/average total assets; CFO=cash flow from operations/average total assets.
ΔWCAQ	Change in WCAQ from year t-1 to year t.
ZSCORE	Altman's (1968) Z-score: 3.3(EBIT/total assets)+1.0(sales/ total assets) +1.2(working capital/ total assets)+0.6(market value equity/total debt).
ΔZSCORE	Change in ZSCORE from year t-1 to year t.
ZSCORE_NEG	Negative one times ZSCORE.

Appendix B: Data collection for foreign cash holdings and tax havens

Foreign cash holdings:

We perform the following procedures. First, we use Python programming language to conduct a keyword search in all of the 10-K reports for the period 1999-2016 that are available from the SEC's EDGAR database. We create three lists of keywords based on Chen (2015) and patterns summarized from a pilot sample of 10-K filings.

The *first* list of keywords: "held", "held by", "held outside", "held in", "held at", "had", "owned", "located", and "attribute".

The *second* list of keywords: "foreign subsidiar", "international subsidiar", "foreign institution", "international institution", "outside the U.S.", "outside the United States", "outside of the U.S.", "outside of the United States", and "non-U.S.", "foreign", "international", and "oversea".

The *third* list of keywords: "cash equivalents", "short-term investment", "marketable securities", "cash and investment", "cash", and "cash balance".

Our Python algorithm searches for sentences that have at least one word from each of the abovementioned three lists, and then collects the number of foreign cash holdings in the sentence, and also records the whole sentence for our manual verification.

Second, we manually read the recorded sentences to verify the data accuracy. If errors are found, we manually collect the correct number of foreign cash holdings from the 10-K. Note that in most cases, firms disclose this information under "MD&A – liquidity and capital resources" (Chen 2015); thus, our manual check focuses on this section. Finally, we sort our foreign cash data to detect missing firm-year observations of firms that have at least one non-zero observation, and we manually read those firms' 10-K filings in years with missing observations

to verify whether firms disclose this information. In total, we collected 3,355 non-zero samples, and the yearly distribution is shown below.

Table A1: Distribution of raw foreign cash data by year

Fiscal year	Frequency	Percent
1999	1	0.03
2000	1	0.03
2001	2	0.06
2002	14	0.42
2003	23	0.69
2004	37	1.1
2005	44	1.31
2006	46	1.37
2007	55	1.64
2008	69	2.06
2009	79	2.35
2010	116	3.46
2011	315	9.39
2012	438	13.06
2013	491	14.63
2014	537	16.01
2015	543	16.18
2016	544	16.21
Total	**3,355**	**100**

It is clear that although the SEC requests that multinationals disclose foreign cash starting 2009, many firms did not start until 2011 and 2012. Therefore, we delete all firm-year observations with missing foreign cash data before 2011, while we assume foreign cash holdings of zero if a multinational firm does not disclose such information after 2011. The sample of foreign cash (including zeros) is distributed as follows:

Table A2: Yearly distribution of foreign cash data, including zeros

Fiscal year	Frequency	Percent
1999	1	0.01
2000	1	0.01
2001	2	0.02
2002	14	0.13
2003	23	0.22

2004	37	0.35
2005	44	0.42
2006	46	0.43
2007	55	0.52
2008	69	0.65
2009	79	0.75
2010	116	1.1
2011	1,646	15.56
2012	1,647	15.57
2013	1,672	15.8
2014	1,690	15.97
2015	1,741	16.46
2016	1,697	16.04
Total	**10,580**	**100**

After merging with credit rating data and financial data, our final sample includes 2,606 firm-year observations.

Tax haven:

Tax haven data is collected from Exhibit-21 of 10-K, in which firms disclose the name and location of their subsidiaries. We use Python programming language to conduct a keyword search in Exhibit-21 of each firm's 10-K, and we count the number of tax haven jurisdictions in which firms have subsidiaries.

Tax haven jurisdictions are defined by the Organization for Economic Cooperation and Development (OECD 2000 list) and CORPNET report in 2017, including the followings: Andorra, Anguilla, Antigua and Barbuda, Aruba, Bahamas, Bahrain, Barbados, Belize, Bermuda, British Virgin Islands, Cayman Islands, Cook Islands, Cyprus, Dominica, Gibraltar, Grenada, Guernsey, Hong Kong, Ireland, Isle of Man, Jersey, Liberia, Liechtenstein, Luxembourg, Macao, Maldives, Malta, Marshall Islands, Mauritius, Monaco, Montserrat, Nauru, The Netherlands Antilles, Niue, Panama, Samoa, San Marino, Seychelles, Singapore, St. Lucia, St. Kitts and Nevis, St. Vincent and the Grenadines, Switzerland, Tonga, Turks and Caicos, U.S. Virgin Islands, and Vanuatu.